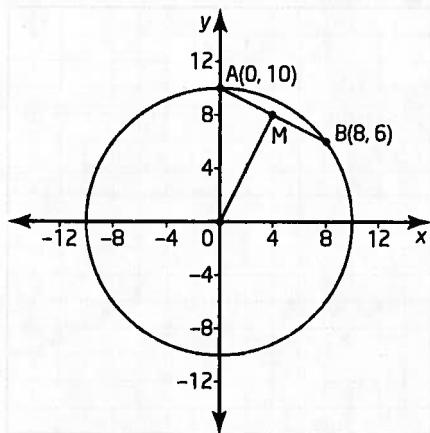


## Practise

For help with question 1, see Example 1.

1. a) Find the coordinates of the midpoint, M, of AB.
- b) Find the slope of the chord AB.
- c) Verify that OM is perpendicular to AB.

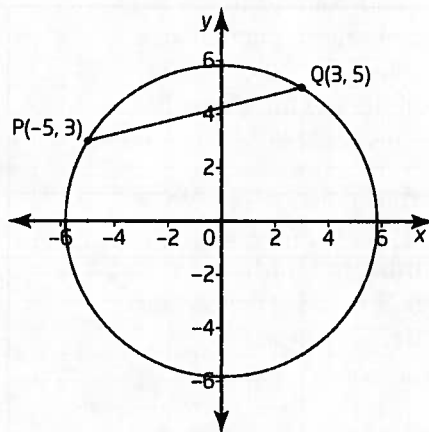


For help with questions 2 to 4, see Example 2.

2. a) Verify that the points P(-1, -2), Q(2, 7), and R(6, 5) are equidistant from the point C(2, 2).
- b) Draw the circle that passes through points P, Q, and R.
3. a) Verify that the points A(12, 6), B(4, 10), and C(0, 2) lie on a circle with its centre at D(6, 4).
- b) Determine the length of the radius of the circle.
- c) Plot points A, B, and C on grid paper, and draw the circle that passes through the points. Use your drawing to check your answers to parts a) and b).
4. a) Verify that the points E(-5, 0), F(-2, 3), and G(6, -11) lie on a circle with its centre at H(2, -4).
- b) Determine the length of the radius of the circle.

## Connect and Apply

5. Verify that the centre of this circle lies on the right bisector of the chord PQ.



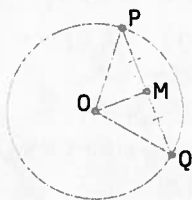
6. a) Explain how you know that the origin is the centre of the circle defined by the equation  $x^2 + y^2 = 45$ .
- b) Verify that the points R(-3, 6) and S(-6, -3) lie on the circle.
- c) Verify that the line through the origin and the midpoint of the chord RS is perpendicular to the chord.
7. A machinist needs to drill a hole in the centre of a circular part. Describe how the machinist could mark the correct location for this hole.
8. a) You have 3.0 m of edging to put around a flower bed. Find the maximum area you can enclose if the shape of the flower bed is an equilateral triangle.
- b) Find the maximum area you can enclose if the flower bed is square.
- c) Find the maximum area you can enclose if the flower bed is circular.
- d) What property of circles makes them a useful shape for the base of storage tanks and some types of buildings?
9. Find the centre of the circle that passes through the points A(-7, 4), B(-4, 5), and C(0, 3).

**10. Use Technology** Use geometry software to answer question 9. Outline your method.

**11.** Three friends live in Sudbury, Toronto, and Windsor. They are planning to go camping together and want to find a park that is approximately the same distance from each of their homes. Describe how the friends could fold an Ontario roadmap to help them find a suitable campground.

**12.** On a town map, the coordinates of three schools are J(8, 13), K(10, 7), and L(14, 15). The town is planning to build a new swimming pool that is the same distance from all three schools. Determine the coordinates for the pool.

**13.** Draw a circle with centre O. Add any chord PQ, with midpoint M. What can you conclude about  $\triangle OMP$  and  $\triangle OMQ$ ? Explain your reasoning.



**14.** Draw any circle. Draw a diameter of the circle and label its endpoints J and K. Let L be any other point on the circumference of the circle. Use angle sums in triangles to show that  $\triangle JKL$  is a right triangle.

**15. Use Technology** Use geometry software to answer question 14. Outline your method.

### Extend

**16.** To find a good location for a community hospital, planners could find the smallest circle that encloses all the homes on a map of the community.

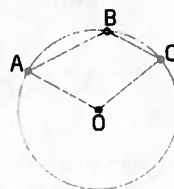
- What is the advantage of a location at the centre of the smallest enclosing circle?
- What other factors might prevent the centre from being the best location for the hospital?

**c)** Using grid paper or geometry software, plot 15 points to represent neighbourhoods. Try to find the smallest circle that encloses these points. Describe the method that you used. Mark where you would place the hospital for the neighbourhoods that the dots represent. Explain why you chose this location.

**17.** A pilot filed a flight plan that listed a cruising speed of 160 km/h with enough fuel on board for 3.5 h of flying. After 2 h, the aircraft passed over Lake Traverse. The aircraft was reported missing when it failed to reach its planned destination.

- Sketch a diagram showing the area where the plane may have crashed.
- How large is this area?
- Which part of the search area should be searched first? Explain your reasoning.

**18. Math Contest** Show how  $\angle ABC$  and  $\angle AOC$  in quadrilateral ABCD are related.



**19. Math Contest** Keshawn and Samantha are in a science class with 18 other students. The teacher randomly divides the class into 10 pairs of laboratory partners. The probability that Keshawn and Samantha are laboratory partners is

- $\frac{1}{10}$
- $\frac{1}{19}$
- $\frac{1}{20}$
- $\frac{1}{190}$
- $\frac{1}{380}$